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Sigurlin Bjarney Gísladóttir
Sigurlin Bjarney Gísladóttir
Patent Division

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A REFUSE COLLECTING APPARATUS FOR A REFUSE COLLECTING VEHICLE

Field of the invention

- 5 The present invention relates to an apparatus arranged on a refuse vehicle for emptying waste bins into container arranged on said refuse vehicle.

Background

- 10 Refuse vehicles are well known. A typical refuse vehicle consists of a waste container and a hydraulic driven lifting mechanism with a gripping and a support mechanism for waste bins. Such lifting mechanism is very powerful and usually does not differentiate between a 10 kg and 500 kg waste bins. The problem that follows is that a very heavy waste bin can easily crack when such power is applied which may cause an injury for the operators operating on such vehicles. Also, some refuse vehicles are provided with
15 press for pressing the incoming waste, thereby minimizing the volume of the waste in the refuse vehicle. However, today it happens that unwanted items such as part of engine is thrown with the usual waste, which can easily destroy the press.

- 20 Today, there is an increasing demand that all the waste should be weighed and that the people pay for the waste per kilo. Therefore, some lifting mechanisms are equipped with weighing means for weighing the waste.

- Due to the fact that the lifting mechanism is hydraulic it is very difficult to perform an accurate weighing on the waste.

- 25 Furthermore, according to the norm EN 1501-1, 6.3, saying:

"The lifting device shall meet the following requirements:

-be designed for the designated waste containers

- 30 - *be designed for the maximum load of the designated waste containers, e.g. EN 840. The test load shall be the maximum load 1,25 times*
- *be provided with a device preventing to be lifted in excess of the maximum load*
- *be provided with a device to accurately locate the designated waste containers*
35 *in the lifting device*

- be provided with a device to automatically lock the designated waste containers in the lifting device (see also clause 6.3.11). The designated waste container shall remain locked in position until the end of the cycle."

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it is a fact that no lifting mechanism in today's refuse vehicle does fulfil these conditions. Also, lifting mechanism for refuse vehicles are generally made as multi purpose devices, i.e. they are used for lifting many different types and sizes of bins in the same round. Due to this it is difficult to fulfill the norm EN 1501-1.

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There is therefore a need for a refuse collecting apparatus arranged on a refuse collection vehicle, where the weight of the waste may be determined accurately, with a safety lock for preventing that accident occur due to overloaded bins, and which fulfils the norm EN 1501-1.

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Description of the invention

It is an object of the present invention to provide an intelligent refuse collecting apparatus, which fulfills the norm EN 1501-1, and which utilizes information from waste bins, such as container code data, to determine at least one characteristic property for the waste bins, typically the maximum weight for the waste bins. This has the advantage that the bins may have different maximum weight limits due to different structures. Some may have high weight limit, such as waste bins in industrial areas, and some will have lower weight limits, such as ones in residential areas.

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It is another object of the present invention to provide a weighing apparatus that weighs the waste bins accurately and wherein the weighing apparatus may either accept or reject the waste bins, depending on whether the weight is below or above the upper weight limit.

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According to the first aspect, the present invention relates to a refuse collecting apparatus arranged on a refuse collection vehicle for emptying waste bins into a waste container arranged on said a refuse collection vehicle, said apparatus comprising:

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- a frame member arranged vertically on said a refuse collection vehicle,

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- a lifting mechanism secured to said frame member comprising a gripping and a support mechanism for said waste bins,
- a mechanism for determining at least one characteristic property of said waste bins integrated into said lifting mechanism,
- means for obtaining at least one information relating to said waste bins prior to emptying it into said waste container, and
- means for utilizing said at least one information for determining at least one criteria for said waste bins, whereby arranging said waste bins on said lifting mechanism said at least one characteristic property of said waste bins is determined and compared to said criteria and based thereon the lifting mechanism accepts or rejects said waste bins.

In one embodiment the mechanism for determining at least one characteristic property of said waste bins is a weighing means, wherein the weighing may be based on monitoring the power required to lift said waste bins, such as by monitoring the applied voltage and/or the applied current. Other types of weighing means may also be integrated into the lifting mechanism. One preferred criteria to determine is the upper weight limit of the waste bins. This is preferably done by obtaining information relating to the volume of the waste bin, which may be provided through an identification tag on the waste bins. Based on the volume information, the maximum weight limit of the bins can easily be estimated by multiplying an average mass density with said volume.

Accordingly, as the measured weight of the waste bins exceeds said upper weight limit, the bin is rejected, such as by providing the collecting apparatus with an alerting system, wherein as the weight of the waste bin exceeds said upper weight limit the alerting system is activated or simply by rejecting it by the operator, which compares the actual weight to the upper weight limit. Thereby, the risk of that the waste bin can crack is prevented and thereby a possible accident.

In another embodiment the refuse collecting apparatus is further provided with a computer system. Thereby, the operator may select an upper weight limit, which is stored in the computer system and wherein the apparatus determines automatically whether the weight exceed the stored upper weight limit or not. Example: in a normal

residential area the bins vary in size and consequently their upper weight limit varies as well. Typically there would be found 3-6 different upper weight limits in the same round. Rounds are almost never homogeneous in terms of bins. Same goes for industrial collection, typically ranging – and varying – between 240 l and 700 l bins in the same round.

The lifting mechanism may in one embodiment comprise a conveyor belt arranged between two wheels (such as driving wheel and a sprocket wheel) such that the belt forms an endless loop, and is fastened vertically on said frame member. In a first position the waste bin is hooked on the gripping and the support mechanism. The weight of the waste bin is determined and compared to said upper weight limit. In order to control the lifting mechanism accurately, it is preferred that the lifting mechanism is electrical driven.

In still another embodiment the lifting mechanism is exchangeable, i.e. different lifting mechanism may be secured to the same frame member. It follows that the same refuse collection vehicle can be provided with different lifting mechanism and thereby the same refuse collection vehicle may be used in industrial area or in a normal residential area, where the upper weight limits are different.

In a further embodiment two or more lifting mechanism are arranged side by side on said frame member and wherein the lifting mechanism are displaceable such that they may act as independent units or together as a single unit.

Detailed description

In the following the present invention and more particularly are preferred embodiment thereof is described in more details, in which

Figure 1 shows a collecting apparatus arranged on a refuse collection vehicle 11, a waste bin 1 and the lifting mechanism 13. As Fig. 1 shows the lifting apparatus is arranged vertical on the frame member 6. In one embodiment the frame member is such that the lifting mechanism is displaceable horizontal and optionally vertical. Thereby, one or more lifting mechanism 12 may be arranged on the frame member and run simultaneously. In another embodiment said one or more lifting mechanism may run as a one unit in lifting as an example the same waste bin. Also, the fastening between

the lifting mechanism and the frame member is such that the lifting mechanism is changeable. Therefore, a refuse collection vehicle is not bound to the same lifting mechanism.

- 5 In Fig. 1 the waste bin 1 is labelled with at least one information, such as the volume and/or the type of the bin through a media such as RFID chip or a Bar-Code and these are extracted with a media reader 8 which transmits information to a computer 7, which utilizes the information to determine at least one characteristic property relating to the bin. An operator may be provided with such media reader, or the media reader may be
10 arranged on the lifting mechanism.

- In one preferred embodiment said characteristic property is the upper weight limit, whereby the upper weight limit is determined by multiplying the volume with an average mass density. The weight may also be predetermined for different bin volumes, e.g. 150
15 litre bin correspond to 70 kg etc. This information may be obtained as an example by scanning the media 3 on the waste bin.

- After arranging the bin 1 on the gripping and a support mechanism 2, an exact weighing of the bin is performed. This is preferably done by reading the power required to lift the
20 waste bin, i.e. by monitoring the current and/or the voltage required to lift the waste bin on an Amper meter 9 through said computer 7 wherein these values are used to read the weight of the bin. If the weight exceeds an upper weight limit the computer 7 turns off a switch 10 and the lifting is stopped, or is not started. The operator may also stop the lifting manually. The collecting apparatus may be provided with alerting system,
25 which would be integrated into the lifting mechanism, and wherein said alerting system would be activated when the weight of said waste bin exceeds said upper weight limit.

- In the most preferred embodiment, the lifting mechanism 13 is electrical driven, which has the advantage that the lifting may be very well controlled and the weighing is exact.
30 As shown the lifting mechanism comprises a conveyor belt arranged between two wheels, a motor driving wheel 12 and a sprocket wheel 5, wherein the belt forms an endless loop, and is fastened vertically on one side of the garbage container

- As shown in Fig. 1 In a first position the mechanism is in a vertical position and parallel
35 to the conveyor belt. In this position the waste bin is hooked on the gripping and the

support mechanism. Subsequently, if the waste bin is accepted it is lifted vertically upwards by the gripping and the supporting mechanism in the moving direction given by the arrows 4 until the moving direction is changed and the garbage bin obtains a necessary incline so that the garbage slides into the container (not shown). In this
5 second position the driving of the belt is stopped until the bin is empty. The moving direction is reversed and the bin is moved the same way back to the first position.

Claims

1. A refuse collecting apparatus arranged on a refuse collection vehicle for emptying waste bins into a waste container arranged on said a refuse collection vehicle, said
5 apparatus comprising:

- a frame member arranged vertically on said a refuse collection vehicle,
- a lifting mechanism secured to said frame member comprising a gripping and a
10 support mechanism for said waste bins,
- a mechanism for determining at least one characteristic property of said waste bins integrated into said lifting mechanism,
- means for obtaining at least one information relating to said waste bins prior to
15 emptying it into said waste container,
- means for utilizing said at least one information for determining at least one criteria for said waste bins, whereby arranging said waste bins on said lifting
20 mechanism said at least one characteristic property of said waste bins is determined and compared to said criteria and based thereon the lifting mechanism accepts or rejects said waste bins.

2. A refuse collecting apparatus according to claims 1, wherein said mechanism for
25 determining at least one characteristic property of said waste bins is a weighing means.

3. A refuse collecting apparatus according to claim 1 or 2, wherein said weighing means is based on monitoring the applied current and/or the applied voltage required to lift said waste bin.

4. A refuse collecting apparatus according to any of the preceding claims, wherein said criteria is an upper weight limit.

5. A refuse collecting apparatus according to any of the preceding claims, wherein said
35 lifting mechanism rejects said waste bins when the weight of said bins exceed said

upper weight limit and accepts said waste bins when the weight of said bins are equal or below said upper weight limit.

- 5 6. A refuse collecting apparatus according to any of the preceding claims, wherein said lifting mechanism comprises a conveyor belt arranged between two wheels such that the belt forms an endless loop, and is fastened vertically on said refuse collection vehicle.
- 10 7. A refuse collecting apparatus according to any of the preceding claims, wherein said lifting mechanism is electrical driven.
- 15 8. A refuse collecting apparatus according to any of the preceding claims, further comprising an alerting system integrated into said lifting mechanism, and wherein said alerting system is activated when the weight of said waste bin exceeds said upper weight limit.
- 20 9. A refuse collecting apparatus according to any of the preceding claims; wherein said lifting mechanism is exchangeable.
10. A refuse collecting apparatus according to any of the preceding claims, further comprising a computer system.

Abstract

This invention relates to a refuse collecting apparatus arranged on a refuse collection vehicle for emptying waste bins into a waste container arranged on the refuse collection vehicle. A frame member is arranged vertically on said a refuse collection vehicle, a
5 lifting mechanism with a gripping and a support mechanism for said waste bins is secured to the frame member and a weighing means is integrated into said lifting mechanism. Information relating to the weight of the waste bins is provided prior to emptying it into said waste container, and based thereon an upper-weight-limit of the waste bin is determined. Thereby by arranging the waste bin on the lifting mechanism.
10 the weight of the waste bin is monitored through the weighing means and whereas the weight of the waste bin exceeds the upper weight limit the lifting mechanism rejects the waste bin.

Figure 1

1/1

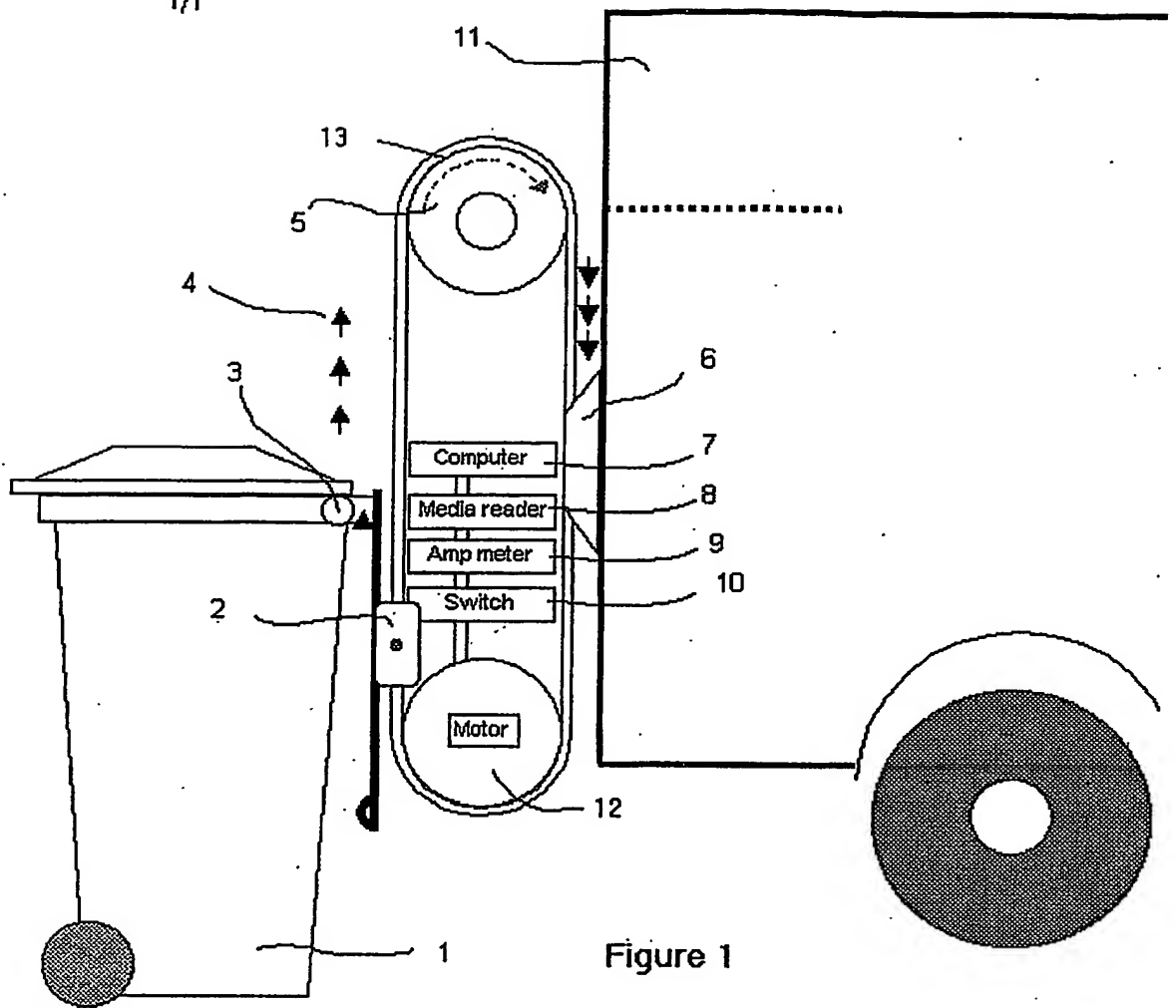


Figure 1

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